WHAT IS CLAIMED IS:

1. An object recognition apparatus for a vehicle comprising:

radar means for emitting a plurality of transmission waves throughout a predetermined angular range in each of vertical and horizontal directions of said vehicle to, on the basis of reflected waves thereof, detect distances to reflecting objects, angles in said vertical and horizontal directions and intensities of said reflected waves;

decision means for, when a plurality of reflecting objects satisfy a predetermined unity condition, making a decision that said plurality of reflecting objects constitute a unitary reflecting object;

selection means for selecting the highest intensity of intensities of reflected waves corresponding to said reflecting objects decided to be a unitary reflecting object in said decision means; and

recognition means for recognizing said reflecting objects on the basis of said distance and said angles in said vertical and horizontal directions which are detection results acquired by said radar means, and for enhancing a probability of said reflecting object being recognized as a non-vehicle when the highest intensity selected by said selection means is lower than a predetermined reference intensity.

2. The apparatus according to claim 1, wherein said predetermined reference intensity is set at a lower value for a long distance to the reflecting object than for a short distance thereto.

3. The apparatus according to claim 1, further comprising shape calculation means for calculating a shape of said reflecting object on the basis of said distance and said angles in said vertical and horizontal directions detected by said radar means so that said recognition means enhances the probability of said reflecting object being recognized as a non-vehicle when the highest intensity thereof is

lower than said predetermined reference intensity and said shape of said reflecting object is different from a vehicle shape.

4. The apparatus according to claim 3, wherein, when a width of said shape of said reflecting object is shorter than a width of said vehicle shape, said recognition means recognizes that said shape of said reflecting object is different from said vehicle shape.

5. The apparatus according to claim 1, wherein, on the basis of the highest intensity of said reflected wave, said recognition means conducts processing of enhancing the probability of said reflecting object being recognized as a non-vehicle when said distance to said reflecting object is shorter than a predetermined short distance.

6. An inter-vehicle control apparatus comprising:

radar means for emitting a plurality of transmission waves throughout a predetermined angular range in each of vertical and horizontal directions of a vehicle to, on the basis of reflected waves thereof, detect distances to reflecting objects, angles in said vertical and horizontal directions and intensities of said reflected waves;

decision means for, when a plurality of reflecting objects satisfy a predetermined unity condition, making a decision that said plurality of reflecting objects constitute a unitary reflecting object;

selection means for selecting the highest intensity of intensities of reflected waves corresponding to said reflecting objects decided to be a unitary reflecting object in said decision means;

recognition means for, on the basis of at least a shape of said reflecting object, recognizing that said reflecting object is a preceding vehicle;

calculation means for calculating a relative speed with respect to said preceding vehicle in time series on the basis of a variation of said distance to said preceding vehicle and for calculating an average relative speed by averaging a plurality of relative speed calculated in time series;

inter-vehicle control means for implementing inter-vehicle control on the basis of said distance to said preceding vehicle and said average relative speed; and

stability decision means for making a decision as to a recognition stability on said preceding vehicle on the basis of whether or not the highest intensity of said reflected wave selected by said selection means with respect to said preceding vehicle exceeds a predetermined reference intensity, wherein, when said stability decision means makes a decision that said preceding vehicle recognition stability is high, said calculation means enhances the influence of the latest relative speed in calculating said average relative speed.

7. The apparatus according to claim 6, wherein said calculation means decreases the number of relative speeds to be used in calculating said average relative speed to enhance the influence of the latest relative speed with respect to said average relative speed.

8. The apparatus according to claim 6, wherein said calculation means increases a weighting factor for the latest relative speed in calculating the average relative speed to enhance the influence of the latest relative speed with respect to said average relative speed.

9. The apparatus according to claim 6, wherein said stability decision means further makes a decision on the recognition stability on said preceding vehicle on the basis of whether or not a time variation of a shape of said reflecting object

corresponding to said preceding vehicle is smaller than a predetermined reference value.

10. The apparatus according to claim 6, wherein said stability decision means further makes a decision on the recognition stability on said preceding vehicle on the basis of whether or not a position of said preceding vehicle resides within a predetermined distance range in a lateral direction with respect to an extension of one's vehicle in its traveling direction.

11. The apparatus according to claim 6, wherein said stability decision means further makes a decision on the recognition stability on said preceding vehicle on the basis of a period of time for which said preceding vehicle is continuously recognized.

12. An object recognition apparatus for a vehicle comprising:

radar means for emitting a plurality of transmission waves throughout a predetermined angular range in a forward direction of said vehicle to, when each of the transmission waves are reflected by a reflecting object and the reflected wave is received, output a reception signal corresponding to an intensity of the reflected wave; and

recognition means for recognizing an object existing in the forward direction of said vehicle on the basis of a result of the transmission/reception by said radar means,

said radar means including:

distance calculation means for calculating a distance to said reflecting object in an emission direction of the transmission wave on the basis of a time length from the emission of the transmission wave to the reception of the reflected wave; and

intensity calculation means for calculating an intensity of the reflected wave on the basis of said reception signal, and

said recognition means includes first unification for, when said radar means receives a plurality of reflected waves, unifying reflecting objects producing said plurality of reflected waves to recognize them as the same reflecting object in a case in which a difference between distances calculated on the basis of said plurality of reflected waves in said distance calculation means is shorter than a predetermined distance, said plurality of reflected waves are produced by transmission waves emitted close to each other from said radar means, and a difference between the intensities of said plurality of reflected waves calculated by said intensity calculation means is lower than a predetermined value.

13. The apparatus according to claim 12, wherein said intensity calculation means classifies the reflected waves into a plurality of groups according to intensity, and when a plurality of reflected waves are classified as the same group by said intensity calculation means, said first unification means makes a decision that a difference in intensity between the reflected waves falls below a predetermined value.

14. The apparatus according to claim 12, wherein, when the distance calculated in said distance calculation means falls below a predetermined distance, said recognition means excludes the corresponding reflecting object, which is not unified with another reflecting object, from an object of recognition.

15. The apparatus according to claim 12, wherein, when the intensity of the reflected wave calculated in said intensity calculation means falls below a predetermined level and the number of reflected objects to be unified falls below a

predetermined number, said recognition means excludes the corresponding reflecting object from an object of recognition.

16. The apparatus according to claim 12, wherein said first unification means prolongs said predetermined distance, which forms the condition on the difference between the distances calculated on the basis of said plurality of reflected waves in said distance calculation means, as the distance calculated in said distance calculation means becomes longer.

17. The apparatus according to claim 12, wherein, when the number of transmission waves intervening between two transmission waves falls below a predetermined number, said first unification means makes a decision that the transmission waves are emitted close to each other, and decreases the number of transmission waves as the distance calculated in said distance calculation means prolongs.

18. The apparatus according to claim 12, wherein said radar means is made to emit a plurality of transmission waves along a lateral direction of said vehicle, and said recognition means includes second unification means for, when there are a plurality of reflecting objects each produced in said first unification means and each of a distance between said plurality of reflecting objects in a lateral direction of said vehicle and a distance therebetween in an emission direction of the transmission wave is shorter than a predetermined unification decision distance, unifying said plurality of reflecting objects to recognize them as a unitary reflecting object.

19. The apparatus according to claim 18, wherein said second unification means prolongs said unification decision distance as the distance to said reflecting object in the emission direction of the transmission wave becomes longer.

20. The apparatus according to claim 18, wherein said recognition means includes distance/shape calculation means for obtaining a distance to the unitary reflecting object produced in the second unification means and a width of said unitary reflecting object, and said distance/shape calculation means obtains a distance to said unitary reflecting object produced in said second unification means on the basis of a distance to said unitary reflecting object obtained by unifying the reflecting objects having a reflected wave intensity exceeding a predetermined level in said first unification means.

21. The apparatus according to claim 20, wherein, in a case in which said second unification means obtains a unitary reflecting object comprising a plurality of reflecting objects, when the reflected wave intensities of the plurality of reflecting objects are different from each other and a width of said unitary reflecting object exceeds a predetermined length, said distance/shape calculation means excludes the reflecting object having the lowest reflected wave intensity and obtains the width of the unitary reflecting object.

22. The apparatus according to claim 20, wherein said radar means is made to emit transmission waves plural times throughout a predetermined angular range in a horizontal direction of said vehicle while changing an emission angle in a vertical direction of said vehicle, and each of said first and second unification means performs the unification of the reflecting objects to obtain unitary reflecting objects for each transmission wave emission line in the horizontal direction of said vehicle, and said recognition means further includes targeting means for, when said unitary reflecting objects obtained for each emission line exist at positions closet to each other and a difference between moving speeds thereof is below a predetermined speed difference, further unifying said unitary

reflecting objects to recognize the further unified unitary reflecting object as a target.

23. The apparatus according to claim 22, wherein said moving speed of said unitary reflecting object is calculated as a relative speed in the horizontal direction and a relative speed in the transmission wave emission direction with respect to one's vehicle, and when both the relative speeds of each of a plurality of unitary reflecting objects falls below a predetermined speed difference, said targeting means sets said plurality of unitary reflecting objects as a unitary target.

24. The apparatus according to claim 22, wherein, on the basis of a distance to a unitary reflecting object calculated by said distance/shape calculation means, a width of said unitary reflecting object and a relative speed of said unitary reflecting object, said targeting means calculates an estimated area, in which said unitary reflecting object exists, at each detection time interval of said radar means, and when another unitary reflecting object pertains to said estimated area, said targeting means makes a decision that said unitary reflecting objects exist at positions close to each other.

25. A distance measurement apparatus comprising:

outputting means for emitting a transmission wave to around a vehicle to output a reception signal corresponding to an intensity of a reflected wave thereof;

decision means for making a decision as to whether or not an amplitude and a wavelength of said reception signal satisfy a predetermined relationship; and

detection means for detecting a distance to a reflecting object on the basis of said reception signal satisfying said predetermined relationship as a decision result in said decision means.

26. The apparatus according to claim 25, wherein said decision means includes:

first amplitude decision means for making a decision as to whether or not the amplitude of said reception signal exceeds a predetermined first predetermined value;

second amplitude decision means for making a decision as to whether or not the amplitude of said reception signal exceeds a second predetermined value smaller than said first predetermined value; and

time width decision means for making a decision on the relationship in magnitude between a time width for which the amplitude of said reception signal exceeds said second predetermined value and a preset reference time width,

a decision being made as to whether or not the magnitude of the amplitude of said reception signal decided by said first and second amplitude decision means and the length of the time width decided by said time width decision means satisfy said predetermined relationship.

27. The apparatus according to claim 26, wherein said reference time width is set at a time width for which the amplitude of said reception signal exceeds said second predetermined value in a case in which the amplitude of said reception signal exceeds said first predetermined value and said reception signal is in a normal condition.

28. The apparatus according to claim 26, wherein said decision means makes a decision that said predetermined relationship is not satisfied, when said first amplitude decision means makes a decision that the amplitude of said reception signal does not exceed said first predetermined value, said second amplitude decision means makes a decision that the amplitude of said reception signal exceeds said second predetermined value and said time width decision means makes a decision that the time width exceeds said reference time width.

29. The apparatus according to claim 26, wherein, in a case in which said first amplitude decision means makes a decision that the amplitude of said reception signal exceeds said first predetermined value and said time width decision means makes a decision that the time width does not reach said reference time width, said decision means replaces the time width with said reference time width and makes a decision indicative of the satisfaction of said predetermined relationship.

30. The apparatus according to claim 26, wherein said detection means includes:

a first intermediate time correction means for, when a decision result in said first amplitude decision means shows that the amplitude of said reception signal exceeds said first predetermined value, correcting an intermediate time of the time width for which the amplitude of said reception signal exceeds said first predetermined value so that said intermediate time agrees with a time at which the amplitude of said reception signal reaches a maximum value; and

a second intermediate time correction means for, when a decision result in said second amplitude decision means shows that the amplitude of said reception signal exceeds said second predetermined value and a decision result in said first amplitude decision means shows that the amplitude of said reception signal does not exceed said first predetermined value, correcting an intermediate time of the time width for which the amplitude of said reception signal exceeds said second predetermined value so that said intermediate time agrees with a time at which the amplitude of said reception signal reaches a maximum value,

the distance to said reflecting object being detected by obtaining a time difference between the time of the emission of said transmission wave and the corrected intermediate time. .

31. The apparatus according to claim 30, further comprising correction quantity changing means for, when the distance to said reflecting object detected by said detection means is below a predetermined distance, changing correction quantities in said first intermediate time correction means and said second intermediate time correction means.